Review Article

Evaluation and management consideration for children who are visually impaired

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Abstract:

Clinical low vision evaluations provided by optometrists or ophthalmologists trained and experienced in low vision rehabilitation care should be recommended for all children with a visual impairment, regardless of the cause of their vision loss, their age or the severity of their additional disabilities. This article discusses an effective model for pediatric vision rehabilitation service.

Keywords:

Clinical low vision rehabilitation, low vision, pediatric, visual impairment

Introduction

Clinical low vision evaluations provided by optometrists or ophthalmologists trained and experienced in low vision rehabilitation care should be recommended for all children with a visual impairment, regardless of the cause of their vision loss, their age, or the severity of their additional disabilities. However, eyecare professionals continue to overlook clinical low vision care as an integral component in the treatment of children that are visually impaired, especially if they don't provide these services themselves.

An effective model for pediatric vision rehabilitation services for children and students who are visually impaired requires a collaboration of clinical information from the eye care provider and the clinical low vision rehabilitation practitioner, in conjunction with educational and functional information from the teacher of students who are visually impaired (TVI), classroom teachers, certified orientation & mobility specialist (COMS), the child's parents, and the children themselves as they mature.

Functional and educational rehabilitation outcomes should focus on the student's individual needs for school, community, and vocational tasks, as well as concerns about independent travel abilities. Also, consideration needs to be given to the student's personal goals and desires such as reading leisure materials, recreational sports, and other avocational activities.

The American Optometric Association's Clinical Practice Guidelines,[1] the National Eye Institute's National Eye Health Education Program,[2] the American Academy of Ophthalmology's Preferred Practice Pattern for Vision Rehabilitation[3] and the American Academy of Optometry's Position Paper on Clinical Low Vision Evaluation and Treatment of Students with Visual Impairments for Parents, Educators and Other Professionals,[4] recognize the importance of low vision rehabilitation in the treatment and management of children with visual impairments. These organizations acknowledge that low vision rehabilitation/habilitation is the main treatment modality for permanent visual impairment and is the primary strategy to prevent a visual impairment from becoming a disability or a handicap.

What is Low Vision?

The National Eye Institute defines low vision as a bilateral visual impairment that is not correctable by standard glasses, contact lenses, medicine, or surgery, and that interferes with the person's ability to perform everyday activities.[5]

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Similarly, under the Individuals with Disability in Education Act (IDEA) Section 300.8(13), visual impairment means an impairment in vision (after best-correction with glasses or contact lenses) that adversely affects a child's educational performance.[6]

Statistics

United States data estimates that 0.2% of the school age population is comprised of children with low vision or blindness.[7] Of these, only 10–15% are considered to be functionally or totally blind.[8,9] Despite the low prevalence of visual impairment in the school age population, childhood vision impairment is a significant public health problem as it affects children across their lifespan.

Eye conditions that result in childhood visual impairment include congenitally acquired conditions, such as albinism, achromatopsia, aniridia, congenital glaucoma, congenital cataracts, Leber's congenital amaurosis, nystagmus, optic nerve hypoplasia, and retinopathy of prematurity, as well as conditions that develop after birth such as cone-rod dystrophy, dominant optic atrophy, retinitis pigmentosa, and Stargardt disease. Systemic conditions that result in childhood visual impairment include genetic and developmental syndromes such as Usher syndrome and Bardet Biedl syndrome, as well as congenital or acquired neurological conditions that result in cortical visual impairment or cerebral visual impairment (CVI). The additional disabilities associated with systemic conditions can impact how the clinical low vision evaluation is performed and what treatment strategies are employed by the low vision team.

Studies indicate that 40–66% of children with visual impairments have additional disabilities that may include cognitive limitations, speech and language problems, hearing impairment and deafness, motor and orthopedic difficulties, such as cerebral palsy, seizures and autism among many other conditions. Despite these multiple impairment challenges, 75–80% of this population will have some useful level of vision.[10,11]

Clinical Low Vision Rehabilitation Evaluations

A clinical low vision rehabilitation evaluation should be recommended for all children with a vision impairment as an adjunct to their current ophthalmic care. Whereas the role of the eye care provider (which may include both ophthalmologist and optometrist) is to maximize a child's visual capabilities through all available medical, surgical, and optical means, the role of the clinical low vision rehabilitation practitioner is to maximize the child's functional vision capabilities. The term "functional vision" is used to describe what the child with low vision is able to do visually with their remaining vision in the real world, as opposed to in a clinical setting.

Comprehensive clinical low vision rehabilitation care should begin as soon as a visual impairment has been identified, regardless of a child's age or presence of any additional physical or developmental disabilities. Although infants and toddlers who are visually impaired will not have low vision devices prescribed for them, an assessment of their refractive status and current level of visual functioning will help their educational team plan for early intervention activities and future educational needs. Additionally, a clinical low vision rehabilitation evaluation will provide the infant or toddler's parents with information concerning their child's current visual functioning and expected visual abilities as they mature.

The incorporation of an individualized rehabilitation/habilitation plan into an Early Intervention Program can provide children with better access to their visual environment, minimize the impact of visual impairment on everyday activities, and smooth the transition to school. Ongoing clinical low vision rehabilitation care, throughout the preschool/K-12 educational program, is imperative because visual needs change throughout their educational years and into adulthood. Clinical low vision rehabilitation evaluations are especially important at transition times, such as when entering primary and secondary school programs, or when students are preparing to enter college or a vocational training program.

A clinical low vision rehabilitation evaluation is a specialized eye examination that focuses on visual function as well as the prescription of adaptive equipment to maximize the use of the child's limited vision. An optometrist or ophthalmologist trained and experienced in low vision rehabilitation uses a variety of standard and modified testing techniques to obtain information about the student's visual condition including, but not limited to, best-corrected distance and near visual acuity, central and peripheral field of vision, accommodative focusing ability, range of eye movements, eye alignment, depth perception, color vision, ability to see low contrast objects, and ability to function under different levels of illumination.

When indicated, the clinical low vision rehabilitation practitioner will prescribe corrective lenses and adaptive devices that enable the student to use residual vision more efficiently for learning as well as for everyday activities. A report is provided that includes recommendations for optimum print size and contrast enhancement strategies for both reading and writing activities, magnification needs (including adaptive devices and technology), lighting control and glare reduction strategies, as well as viewing and mobility strategies to reduce the effects of central blind spots or significant visual field loss (if present). Further recommendations are made regarding field of vision and placement of educational materials to enhance the use of residual field and reduce nystagmus (if present), acuity-related classroom seating and other classroom environmental modifications to enhance the use of the student's available vision for learning. For students who experience discomfort from indoor or outdoor glare, recommendations are made for specialty lens tints and glare-reducing coatings for their spectacles to increase visual comfort under a wide range of lighting conditions.

Clinical low vision rehabilitation evaluations should be ongoing and integrated into the ongoing care provided for all children who are visually impaired. Having available information about the visual abilities of children with visual impairments is critically important for successful habilitation and rehabilitation outcomes.

A clinical low vision rehabilitation evaluation can provide the following information to the ophthalmic practitioner and educational team.

- Baseline acuity measurements and general visual functioning level.
- Assessment of visual skills to determine if the extent of vision loss could be a major factor affecting other developmental areas.
- Assistance for parents and teachers to better understand the child's visual condition and visual functioning, i.e., "how" he/she sees.
- Determination as to whether there is refractive error and if it is significant enough to need corrective lenses.
- Information and assistance in determining the most appropriate learning/literacy media.
- Assessment of low vision devices, technology equipment, or other adaptations and accommodations that can enhance the student's functioning level in school and in their community.
- Assistance to educational team members with trial and acquisition of recommended devices, equipment, or strategies.
- Assessment of driving vision for acquiring an instructional permit or driver's license if appropriate.
- Provision of timely re-evaluation to address changes in vision and the positive or negative effect on visual function status, as well as changes in visual demand as student progress through their educational program.

Low vision rehabilitation care must be comprehensive to ensure that children with a visual impairment have the devices and techniques needed to assist them in their educational, vocational, self-help, and recreational activities. It must also be ongoing, since the child's visual needs may change over time with changes in their visual system, the demands of their work or school, and their personal goals for vision utilization.

The clinical low vision rehabilitation practitioner initiates and maintains ongoing communication with other members of the low vision team. At the conclusion of the clinical low vision rehabilitation evaluation, the team members review the student's capabilities to be sure that he or she can easily and efficiently use the devices that have been recommended to accomplish specified goals. The clinical low vision rehabilitation evaluation also results in referrals to other services or resources when appropriate.

Members of the Low Vision Rehabilitation Team

Providing care for children who are visually impaired requires a multidisciplinary team that can include the primary eye care practitioner, a clinical low vision rehabilitation practitioner that is either an optometrist or ophthalmologist specifically trained and with experience in low vision rehabilitation care, a teacher of students with visual impairments (TVI), a certified orientation and mobility instructor (COMS), classroom teacher(s), a technology consultant, vocational rehabilitation counselors, occupational therapists as well as physical and speech therapists, depending on the needs of the child.

The clinical low vision rehabilitation practitioner provides the clinical low vision evaluation. This clinical low vision rehabilitation practitioner will have had specialized training in low vision rehabilitation either during his or her optometric or ophthalmological training or in a fellowship program and may have gained additional experience in low vision rehabilitation care in a mentorship program. It is essential that the specialist has had experience evaluating and caring for children that are visually impaired from a variety of eye conditions.

The Teacher of Students who are blind or Visually Impaired (TVI) addresses specific educational needs. The Certified Orientation and Mobility Specialist (COMS) reviews the child's functional abilities for independent travel, both indoors and outdoors in varying lighting conditions. Through a COMS evaluation, common mobility questions can be addressed including whether or not the child is able to cross a street, walk to school, ride a bike, a moped and/or drive a car. A COMS will also assess and train mobility skills in lower lighting and unfamiliar conditions to be sure the student maintains safe mobility in all environments.

Both the TVI and COMS work together to perform a functional vision assessment and provide a report to the clinical low vision rehabilitation practitioner before the clinical evaluation. A functional vision assessment reviews the use of vision at near and distance, visual field preference, tracking and scanning abilities, visual attention, ability to reach or move toward an object, responses to lighting and color, and perceptual abilities. This information is helpful for the clinical low vision rehabilitation practitioner to have prior to their assessment of the child.

Technology

Technological advances to assist students with low vision include optical character recognition, text-to-speech synthesizers, computer speech synthesis, variable size fonts, and contrast enhancement devices. The technology team and rehabilitation specialist will review these options with the educational team to determine what is most appropriate for a given student. The expertise of a technology consultant is invaluable in answering questions regarding access to technology and it's use to increase visual function.

The technology consultant considers low tech to high tech solutions, facilitates access to technology, makes referrals for local follow-up or provides follow-up in the student's home, school, and community. Review of technology options should

be part of the ongoing process to determine what additional learning and literacy media will best meet the needs of students with visual impairments. To address questions, the technology consultant considers factors as outlined in the Student Environment Tasks and Tools (SETT) framework.[12]

SETT

Student information

- The eye condition(s)
- Low vision evaluation findings
- Functional vision information
- Consideration of other impairments

Environments

- Home
- School
- Vocational
- Community

Tasks

- Specific activities that a student may require assistive technology

Tools

- Specific devices required by the student to function as independently, efficiently, and competitively as possible.

As technology continues to advance within the classroom, community, and home, technology consultants become more critical in helping a student obtain the tools needed for successful tech-function in these environments.

The developments seen in technology over the past decade have removed significant barriers for all individuals with vision loss, allowing them to engage in activities that would have been inaccessible in the past, and allowing them to do so alongside individuals without visual impairment. Carrying devices is no longer stigmatized, but commonplace, and these portable, handheld or wearable technology tools are advanced enough to provide visual accessibility to those with vision impairments. For example, despite their small screens and keypads, several features built into smart phones and tablets make them easily accessible to users who are blind or visually impaired. Leading the industry are Apple products that provide many accessibility options to users with vision loss through their VoiceOver and Zoom programs.

VoiceOver is an audio screen reader that uses text-to-speech to dictate out loud what is printed on screen, to confirm selections, respond to typed letters and commands, and integrate keyboard shortcuts that make application and web page navigation easier. The Zoom app magnifies everything onscreen from 1.2 to 15 times its original size while maintaining text resolution. Additional accessibility options include the "Large Text" option which allows the user to select a larger font size (20–56 point) for any text appearing on their device, and reverse-contrast option. Many individuals with vision loss respond better to visual text that is displayed as "White on Black". This reversal of contrast is often the only accommodation needed for an individual with a visual impairment to easily read on their phone or tablet. Additionally, there are free or low-cost apps for smart phones and tablets that allow the device to function like a hand-held video magnifier. Finally, there are free or low-cost apps for smart phones and tablets that allow the device to function as an optical character reader to read printed and hand-written text, identify currency, and interpret bar codes.

The multidisciplinary low vision team will work together to assess the strengths and weakness of the student with respect to their educational, vocational, and avocational pursuits. They will work with the student to help him or her function at their highest potential during their formal education years and later as adults.

Reports

When reporting a child's visual status, it is important to include the following elements in the report.

- Diagnosis
- Prognosis that realistically states the expected course of the visual condition over time.
- Eye Medications
- Color Vision Deficiencies
- Visual Acuity: distance
- Visual Acuity: near with working distance for reading
- Recommended reading print-size (if known)
- Visual field limitations
- Photophobia that requires intervention when indoors and/or outdoors
- Restrictions in activities including the potential need to restrict certain sports activities (e.g., small, high-velocity ball sports) or to create an adapted physical education program.
- Special contrast needs and/or lighting requirements
- Spectacle requirements (e.g., full-time use, distance only or reading only)
- Optical and/or electronic magnification devices recommended/prescribed
- Next evaluation date

Summary

Low vision rehabilitation is the only non-surgical treatment modality for vision loss. This is why it is essential that children with visual impairments have access to ongoing clinical low vision rehabilitation care. Ongoing clinical low vision rehabilitation evaluations, performed by optometrists or ophthalmologists trained and experienced in low vision rehabilitation, is an essential component in the educational planning for every child with a visual impairment. The clinical low vision rehabilitation evaluation provides all adults involved in the care, education, and habilitation/rehabilitation of children with visual impairments with critical information about the nature and severity of a child's visual impairment and strategies for enhancing the child's use of remaining vision. These strategies include corrective lenses, magnification and other low vision adaptive devices, as well as services and

accommodations that would increase the child's access to visual information at school and during activities of daily living.

Students with visual impairments should have access to prescribed optical and/or electronic adaptive devices, instruction in the use of prescribed devices, and recommended habilitation/rehabilitation services throughout their educational program. Information provided by ongoing clinical low rehabilitation vision evaluations ensures that Early Intervention Programs for young children and Individualized Educational Programs for school-age children are truly individualized for the visual needs of children with visual impairments and provides these children with the best opportunity for successful growth and development.

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Conflicts of interest

There are no conflicts of interest.

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